

WHAT IS CLAIMED IS:

- 1           1. A carrier for a semiconductor die package, the carrier comprising:  
2           (a) a metal layer; and  
3           (b) a plurality of bumps formed in the metal layer,  
4           wherein the carrier is for electrically coupling a semiconductor die to a circuit  
5           substrate.
  
- 1           2. The carrier of claim 1 wherein the metal layer comprises copper.
  
- 1           3. The carrier of claim 1 wherein the plurality of bumps are disposed in  
2           an array and are stamped bumps.
  
- 1           4. The carrier of claim 1 further comprising:  
2           a die attach region, and wherein the plurality of bumps are arranged around the  
3           die attach region.
  
- 1           5. The carrier of claim 1 further comprising a dielectric layer, wherein the  
2           metal layer is on a dielectric layer.
  
- 1           6. The carrier of claim 1 wherein the metal layer includes one or more  
2           sublayers of material on a base metal.
  
- 1           7. The carrier of claim 1 wherein the metal layer is discontinuous and  
2           includes a plurality of etched conductive lines that lead to the plurality of bumps.
  
- 3           8. The carrier of claim 1 wherein each bump has a conical angle of about  
4           40 degrees or more.
  
- 1           9. The carrier of claim 1 wherein each bump has a conical shape.
  
- 1           10. A semiconductor die package comprising:  
2           (a) a carrier comprising a metal layer, a die attach region, and a plurality  
3           of bumps formed in the metal layer; and  
4           (b) a semiconductor die electrically coupled to the die attach region of the  
5           carrier.

1               11.     The die package of claim 10 wherein the plurality of bumps are  
2 stamped bumps and are arranged around the die attach region, and wherein each of the bumps  
3 has a height that is greater than or equal to a thickness of the semiconductor die.

1               12.     The die package of claim 10 wherein the carrier comprises copper.

1               13.     The die package of claim 10 wherein the carrier comprises:  
2 a base metal with one or more coatings on the base metal.

1               14.     The die package of claim 10 wherein each bump has a conical angle  
2 greater than about 40 degrees.

1               15.     The die package of claim 10 wherein the semiconductor die comprises  
2 a vertical metal oxide semiconductor field effect transistor (MOSFET) device.

1               16.     The die package of claim 10 wherein the semiconductor die comprises  
2 a vertical metal oxide semiconductor field effect transistor (MOSFET) device having a source  
3 region, a gate region, and a drain region, wherein the drain region is proximate to the die  
4 attach region of the carrier, and the source region and the gate region are distal to the die  
5 attach region of the carrier.

1               17.     The die package of claim 10 wherein each stamped bump has a conical  
2 shape.

1               18.     The die package of claim 10 wherein the bumps and the semiconductor  
2 die are at opposite sides of the carrier.

1               19.     The die package of claim 10 wherein the bumps and the semiconductor  
2 die are at the same side of the carrier.

1                   20.     A semiconductor die package comprising:

2                   (a) a carrier comprising metal layer, a die attach region, and a plurality of

3     stamped bumps formed in the metal layer around the die attach region;

4                   (b) a semiconductor die comprising a vertical metal oxide semiconductor field

5     effect transistor (MOSFET) device having a source region, a gate region, and a drain region,

6     wherein the drain region is electrically coupled to and proximate to the die attach region of

7     the carrier, and the source region and the gate region are distal to the die attach region, and

8     wherein the plurality of stamped bumps in the carrier are arranged around the semiconductor

9     die; and

10                  (c) a plurality of solder deposits disposed on the semiconductor die.

1                   21.     The semiconductor die package of claim 20 wherein the each of the

2     bumps has a conical angle greater than about 40 degrees or more.

1                   22.     The semiconductor die package of claim 20 wherein the carrier

2     comprises copper.

1                   23.     The semiconductor die package of claim 20 the plurality of bumps are

2     formed simultaneously in the metal layer.

1                   24.     A method for forming a carrier for a semiconductor die package, the

2     method comprising:

3                   (a) providing a metal layer; and

4                   (b) forming a plurality of bumps in the metal layer, wherein the formed

5     bumps are capable of being electrically coupled to conductive regions of a circuit substrate.

1                   25.     The method of claim 24 wherein forming the plurality of bumps

2     comprises stamping.

1                   26.     A method for forming a semiconductor die package, the method

2     comprising:

3                   (a) forming a carrier according to the method of claim 24; and

4                   (b) attaching a semiconductor die to the metal layer after forming the

5     plurality of bumps.

1                   27. The method of claim 26 wherein (c) attaching comprises:  
2                   attaching the semiconductor die to a die attach region of the carrier, and  
3                   wherein the plurality of bumps is disposed around the semiconductor die.

1                   28. The method of claim 26 wherein forming the plurality of bumps  
2                   comprises stamping.